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effect the production of sexual organs were haemoglobin and leucin, as found also by KLEBS. The effect of nutrition upon the differentiation of reproductive and vegetative processes was amply confirmed; but not all species produce sexual organs under the same conditions, showing a physiological as well as a morphological distinction. *S. hypogyna*, in which true antheridia do not develop, was made to develop antheridia under proper nutrient conditions. The variations induced were so extensive as to include all the characters used for diagnostic purposes, and the author makes the suggestion that a species can be defined in terms of its behavior in an established standard culture. The conclusion is reached that there are a great many entirely distinct forms, physiologically so at least, which may be regarded as elementary species in the sense of DEVRIES. The whole tendency of the investigation is to confirm the doctrine that sex in plants is determined by external conditions.—J. M. C.

The sporangiophore.—Miss BENSON²¹ has emphasized the morphological importance of the sporangiophore, and has extended its application. Originally applied in Sphenophyllales, Equisetales, and Psilotales, she would extend its application to all pteridophytes. Objection is made to BOWER's application of the term in Ophioglossales to the "fertile spike." In the Filicales the sorus (or synangium) is the sporangiophore; while in Lycopodiales it appears in a "reduced" form as the subarchesporial pad. Primarily it is a unit structure that appears on the axis, but may be "taken up on to" the leaf, as in all known ferns and many Lycopsidea. The definition suggested is that "a sporangiophore is a structure characteristic of the sporophyte of Pteridophyta, and consists of a central, generally pedicellate mass of sterile tissue, with sporogenous regions occupying one or more sporangia, which may be terminal, lateral, or basal." It is further suggested that even Cordaitales and Taxineae may be forms whose sporangiophores have never been "taken up" on leaves. All this means a monophyletic origin for pteridophytes, with the sporangiophore (as now defined) as a fundamental and unifying structure of the sporophyte. Such a hypothesis is worth thinking about, and it has enough facts to support it to make it seductive.—J. M. C.

Schizostely in Gramineae.—Schizostely has been seldom observed among the flowering plants, the recorded cases being in certain representatives of Alismaceae, Nymphaeaceae, Cabombaceae, and Ranunculaceae. Recently VAN TIEGHEM²² has discovered this singular structure in *Sorghum halepense* Pers. So far only the monostelic structure has been observed in the aerial and subterranean stems of the numerous Gramineae examined. While the aerial stem of this *Sorghum* is monostelic, the rhizome possesses a large number of meristemes

²¹ BENSON, M., The sporangiophore—a unit of structure in the Pteridophyta. New Phytol. 7: 143-149. 1908.

²² VAN TIEGHEM, PH., Une graminée à tige shizostélique. Ann. Sci. Nat. Bot. IX. 5: 371. 1907.

in the cortex, which are of a very different size, but each is surrounded by a special and very plainly differentiated endodermis, in which the Casparyan spots are readily noticeable. The structure of the mestome strand in each is typical, and does not differ from that known so well from the Gramineae in general. The fact that the endodermis is differentiated at a very early stage, and that the inner cell walls become thickened long before the vessels and the adjoining tissues become lignified, makes this schizostelic structure plainly visible in the young rhizome, in the internodes, and partly also in the nodes. It would be interesting to know whether the structure is not to be found in other grasses.—THEO. HOLM.

Morphology of Podostemaceae.—WENT²³ has made some remarkable observations on the ovule of Podostemaceae. He has obtained abundant material and finds the several species studied very consistent with one another and very inconsistent with other Angiosperms. A future more extensive paper is promised, which will deal with all the features of the family.

The outer integument develops first and forms the micropyle. Later the inner integument develops, but never incloses the embryo sac region of the nucellus. The hypodermal megaspore mother cell caps an axial row of cells, which first elongate and then disorganize, resulting in a pseudo-embryo sac inclosed by the inner integument. The true embryo sac enlarges but little, and the embryo grows into and occupies the pseudo-sac. After the first division of the megaspore nucleus, the primary antipodal nucleus degenerates promptly, so that there are no antipodal cells and no antipodal polar nucleus. The four micropylar nuclei form as usual, but the micropylar polar degenerates promptly, so that there is no "double fertilization" and no endosperm. It is to be regretted that alcoholic material and scattered stages did not permit absolute certainty on many points.—J. M. C.

Tracheae of ferns.—GWYNNE-VAUGHAN²⁴ has investigated the xylem of some of the recent ferns, and concludes that the current statement that the metaxylem of Filicales consists for the most part of scalariform tracheids is "thoroughly misleading," and that "a return must be made to the views held by the earlier anatomists (DIPPEL, SACHS, WEISS), who believed that the xylem elements of the ferns in general were true vessels and not tracheids at all." The investigation was induced by studies of certain fossil Osmundaceae, in collaboration with KIDSTON. The conclusions are that the xylem elements of pteridophytes are mostly vessels with true perforations in their longitudinal as well as in their terminal walls. In the Osmundaceae, *Nephrodium Filix-mas*, and probably others, a special type of vessel occurs which is characterized by the complete disappearance of the primary tracheal wall at certain points, so that the cavities of the pits are vertically continuous in the middle of the wall. It is probable that

²³ WENT, F. A. F. C., The development of the ovule, embryo sac, and egg in Podostemaceae. Recueil Trav. Bot. Néerland. 5:1-16. *pl. 1*. 1908.

²⁴ GWYNNE-VAUGHAN, D. T., On the real nature of the tracheae in the ferns. Annals of Botany 22:517-523. *pl. 28*. 1908.